Atty. Dkt. No. 016782-0310

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Lieven Anaf et al.
Title:	Porous metal stack for fuel cells or electrolysers
Appl. No.:	10/501,145
371(c) Date:	7/13/2004
Examiner:	Steven Scully
Art Unit:	1727
Confirmation Number:	5358

DECLARATION UNDER 37 CFR § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Lieven Vangheluwe, declare as follows:

1. I graduated as Master in Textile Engineering from the University of Ghent, Belgium in 1988. I earned a Ph. D. in Textile Engineering from the same university in 1992. After jobs in other companies, I started working for Bekaert in October 2006. I do not receive any specific compensation for preparing this declaration.

2. I have been involved in research in textiles over many years. Part of my research work (e.g. during and after obtaining my Ph. D.) related to cotton yarn properties and the effect of cotton fiber properties on cotton yarn properties.

3. In my research work, cotton fiber fineness and cotton fiber maturity were two important cotton fiber characteristics. Cotton fiber fineness is determined by the cross sectional area of the cotton fiber, whereas fiber maturity is related to the cross sectional shape of the fiber (whether more round, or more oval, or more kidney shaped).

4. In my research work, I have extensively used in the research and industry of cotton fibers the well known *micronaire* test method (ASTM D 1448) as well as the *Fineness and Maturity Tester*. I have studied both test methods thoroughly, to obtain a deep understanding of their way of functioning and meaning of the test results.

5. Both test methods (*micronaire test* and the *Fineness and Maturity Tester*) determine air permeability through a fiber tuft. In both test methods, the fiber tuft is a certain weight of fibers that is brought in a test chamber, where the cotton fibers are present as a fiber web.

6. It is well known in the art that micronaire test results (measured as air flow through a tuft of fibers) is significantly affected by the cross sectional area of the fibers (the fiber fineness) as well as by the cross sectional shape of the fiber (maturity of the cotton fibers: wherein mature fibers have a round or substantially round cross sectional shape and immature fibers have a kidney shaped cross section).

7. The *Fineness and Maturity Tester* measures air permeability for a tuft of cotton fibers. The test is performed on two different levels of compression of the cotton tuft (first at a low compression level, and subsequently at a high level of compression), whereby the compression is in one direction. Thereby, when using the high compression level, a preferential alignment of fibers is created in the direction perpendicular to the direction of compression. Hence, the determination of the air permeability is performed at two different levels of fiber orientation in the fiber web (which is the test sample). The results of the two measurements of air permeability of the same fiber sample are used to calculate the fiber fineness (equivalent fiber diameter) and the fiber maturity (fiber cross sectional shape). This is only possible because the air permeability in a fiber web is significantly affected by the fiber cross sectional shape and by the fiber orientation. The effect is independent of the fiber material (metal fibers will exhibit a same variability as cotton fibers) as the effect is dependent on the geometrical characteristics of the fibers.

8. Therefore, I declare that the planar air permeability as well as the perpendicular air permeability of a fiber web will be significantly affected by the (equivalent) diameter of the fibers as well as by the cross sectional shape of the fibers. The orientation of the fibers in the web will also have an important effect on the planar air permeability and on the perpendicular air permeability of the fiber web.

9. I hereby declare that all the statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this Application for Patent or any patent issuing thereon.

Date June 21, 2011

Dr. Lieven Vangheluwe

Atty. Dkt. No. 016782-0310

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Johan Vandamme, declare as follows:

1. I graduated as Master in mechanical engineering from the University of Ghent, Belgium in 1977. I am currently employed by Bekaert and do not receive any specific compensation for preparing this declaration.

2. I have been actively involved in research on filtration using fiber webs as filtration media.

3. In one of the experiments, I have evaluated the effect of the way of bonding of a web of stainless steel fibers on the air permeability of the webs. The experiment has shown that a stainless steel fiber web that was sintered had a perpendicular air permeability (i.e. measured in the direction perpendicular to the surface of the web) 23% higher than a web made with the same stainless steel fibers, same web density, but bonded by means of capacitor impulse welding. The experiments have been performed

on stainless steel fiber webs with a weight of 450 g/m2. Fibers used in the web were stainless steel fibers obtained via bundle drawing. The fibers had a polygonal section and an equivalent diameter of 22 μm. The perpendicular air permeability has been tested with a Textest FX3300 apparatus at an underpressure of 200 Pa.

4. As air permeability is the permeability in a direction of a fiber web, the same principles and dependencies apply for planar air permeability and for perpendicular air permeability.

5. Therefore, I declare that the way of bonding a stainless steel fiber web affects the planar air permeability and the perpendicular air permeability of the web, independently from its other properties such as fiber diameter, fiber cross sectional shape, porosity, pore shape, fiber orientation, which all affect the planar air permeability and the perpendicular air permeability.

6. I hereby declare that all the statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this Application for Patent or any patent issuing thereon.

June 21, 2011

Date

Johan Vandamme